

Foundation Engineering and Design

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|--------------------------|--------------------------------------|--|------------------|-------------------|
| Course Name | Course type (credit/hours) | Elective course(3/3) | Course code | E070 |
| | Target students Division/major/grade | Civil System Engineering/Junior | Opening semester | 2021 2ND SEMESTER |
| | Class time and classroom | Mon C(Pa1310)Wed C(Pa1310) | English Grade | A(100%English) |
| Reference to this course | Prerequisite courses | - | | |
| | Related basic courses | Soil mechanics. Soil Mechanical Experiment | | |
| | Recommended concurrent courses | | | |
| | Related advanced courses | Ground Stabilization Analysis | | |

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|--------------------|-----------------------|-------------------------------------|---|------------------|--------|----------------------|
| Instructor | Name (title/division) | | Ilhan Chang(Associate Professor , Civil System Engineering) | | | |
| | Office Room Number | Paladal Hall 509 | Office phone Number | 2503 | e-mail | |
| | Office hours | Tue 09:30-10:30 | | Homepage address | | |
| Teaching Assistant | Name (title/division) | | | | | |
| | Office Room Number | Geotechnical Engineering Laboratory | Office phone Number | 2509 | e-mail | kky950317@ajou.ac.kr |

1. Introduction

Foundation is an essential construction member between the overburden structure and underlying ground, which promotes the revelation of ground resistance and transfers the overburden load into the ground through material and geometric dissipation. Foundation Engineering mainly aims to design and assess the stability of practical foundation structures using comprehensive understanding on soil mechanics and geotechnical engineering theories. Thus, this course will cover following subjects for students active learning.

- The importance of reliable ground investigation (survey) for safe and economic feasible civil structure design.
- Ground bearing capacity theories and Shallow foundation design
- Behavior of deep foundations and Pile foundation design
- Behavior of group piles and design
- Foundation on problematic soils
- Ground improvement practices to enhance the ground bearing capacity

2. Course Objectives

Course Learning Outcomes (CLO)

CLO 1: Based on reliable ground investigation results, it is trained to present foundation structure types suitable for field conditions.

CLO 2: It is trained to present key elements of shallow foundation design and alternatives to improving stability.

CLO 3: It is trained to understand the characteristics of stress behavior (end bearing capacity, skin friction force) of deep (pile) foundation structures and to understand the main points of deep foundation construction.

CLO 4: It shall be educated to understand the types of special ground and various ground reinforcement methods for improvement of the relevant ground and to present on-site application methods.

3. Class types and activities

To enhance students understanding and practical applicability on real foundation design and ground improvement practices, state-of-the-art knowledge on ground investigation, shallow foundations, deep foundations, and ground improvement methods will be delivered by main lectures.

In addition, to understand current developments in foundation types and ground improvement methods, team-base term projects will be assigned for students self-learning, reporting, and discussion. All assessment items (assignments, project reports, mid-term and final exams) are asked to be prepared in English, as well as project presentations and discussions will be also conducted with English to improve the capacity of our future global engineers.

All lectures will be delivered via in class mode, but can vary if we face higher level of social distancing (COVID-19 restrictions) situations.

When in class lectures are restricted, all lectures will be delivered through an online platform (Zoom or Blackboard Collaborate).

All students must turn on their camera to validate her/his attendance (No exception). Joined students with turned-off cameras will be regarded as absent.

4. Teaching Method

☒ lecture

☒ discussion and debate

☒ team project(presentation and case studies)

☐ experiments(role-playing,etc)

☐ designing and production

☐ on-site learning(on-site training)

☐ others

5. Support Systems in Use

☒ AjouBb

☐ automatic recording system

☐ web-based assignment

☐ cyber lecture

☒ online content

☐ class behavior analyzing system

☐ others

6. Teaching Tools

☒ PBL(Problem Based Learning)

☐ CBL(Case Based Learning)

☒ TBL(Team Based Learning)

☐ UR(Undergraduate Research)

☐ FL(Flipped Learning)

☐ DSAL(Data Science Active Learning)

☐ others

7. Knowledge and ability required for taking this course

soil mechanics, material mechanics, fluid mechanics, hydraulics

8. Method of Evaluation

| Evaluation Item | The Number of Times | Evaluation Proportion | Remarks |
|-----------------|---------------------|-----------------------|---|
| Attendance | 32 | 10% | In class attendance / For online lectures, students are asked to turn-on their cameras to validate her/his participation. |
| midterm exam | 1 | 20% | Scheduled in Week 8 |
| final exam | 1 | 30% | Scheduled in Week 16 |
| quiz | | | |
| presentation | 1 | 15% | Term project presentation (Scheduled in Week 15) |
| discussion | | | |
| homework | 2 | 15% | Homework Assignments – 2 times (7% + 8%) |
| etc | 1 | 10% | Term project report (Due Week 14) |
| study hours | | | |

9. Textbook and supplementary material

| Main/Sub | Title (Web-site) | Writer | Publisher | Publication year |
|----------|--|-------------------|------------------|------------------|
| Main | Principles of Foundation Engineering. 8th Edition. | Braja M. Das | Cengage Learning | 2016 |
| Sub | Foundation Engineering | 이상덕(Sang Duk Lee) | 씨아이알 | 2014 |

10. Class system and Class shedule

In order to learn background theory and application methods for each foundation structure, classes are conducted in the following order.

1. Foundation theoretical lecture
2. Lecture on the Mechanical Perspective and Design Focus of Foundation Structures
3. Lecture on the Principles and Design of Ground Reinforcement Method for Improving Ground Stability
4. Analysis, presentation and discussion of the latest technology trends through group projects

< Class Schedule >

* language : K-korean, E-English

| Weeks | Topics | language | Instructor | Teaching Method | Evaluation Method | Matter to be prepared |
|-------|--|----------|-------------|----------------------------|--------------------------------|-----------------------|
| 1 | Review on Soil Mechanics (I) | E | Ilhan Chang | Lecture | | |
| 2 | Review on Soil Mechanics (II) | E | Ilhan Chang | Lecture | | |
| 3 | 지반의 조사 및 현장시험 (Investigation of the ground and on-site testing) | E | Ilhan Chang | Lecture | | |
| 4 | Introduction to Foundation Engineering | E | Ilhan Chang | Lecture Design Practice | | |
| 5 | 지반지지력(Ground bearing capacity) | E | Ilhan Chang | Lecture | | |
| 6 | 얕은기초 (Shallow foundations) I | E | Ilhan Chang | Lecture | Homework assignment 1 | |
| 7 | 얕은기초 (Shallow foundations) II | E | Ilhan Chang | Lecture Design Practice | | |
| 8 | 중간고사(Midterm exam) | E | Ilhan Chang | exam | Midterm exam | |
| 9 | 깊은기초(Deep foundation) | E | Ilhan Chang | Lecture | | |
| 10 | 말뚝기초(Pile foundations) I | E | Ilhan Chang | Lecture | | |
| 11 | 말뚝기초(Pile foundations) II | E | Ilhan Chang | Lecture | | |
| 12 | 현장타설 기초(Cast in-situ piles) | E | Ilhan Chang | Lecture | Homework assignment 2 | |
| 13 | 특수지반에서의 기초형식 (Foundations in problematic ground) | E | Ilhan Chang | Lecture | | |
| 14 | 기초지반 보강-다짐 및 치환 (Ground improvement) | E | Ilhan Chang | Lecture | Term project report submission | |
| 15 | 과제 발표 및 토론(Term project presentation) | E | Ilhan Chang | Presentation | Term project presentation | |
| 16 | 기말고사(Final exam) | E | Ilhan Chang | exam | Final exam | |

11. Other items of notification